

FAA National Software Conference

Use of Change Impact Analysis

Honeywell

DER use of Change Impact Analysis Policy

or is it Guidance?

Presented by Tom Roth
at the 2000 FAA software Conference

Topics to be discussed

- Change impact procedure itself
- Change impact analysis data
- ACO issues
- MIDO issues
- Extended uses of change impact analyses
- Marketing and training requirements - new ideas need to be sold
- Fence issues
- With all change comes grief

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Change impact procedure itself

- 1. Introduction
- 2. Definitions / Acronyms
- 3. References to associated and affected processes
- 4. Forms / Records
- 5. Procedures
 - 5.1 Responsibilities
 - 5.2 Minor Software Change Request
 - 5.3 Minor software Change Justification
 - 5.4 Minor Software Change Concurrence
 - 5.5 Minor Software Change Notification to the FAA
- 6. Flow Charts
- 7. Revision History

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Minor Software Change Justification (1 of 3)

- 5.3.1 Traceability
- 5.3.2 Memory Margin
- 5.3.3 Timing Margin
- 5.3.4 Data Flow
- 5.3.5 Control flow
- 5.3.6 Input / Output (Bus Loading)
- 5.3.7 Requirements and Design
- 5.3.8 Code
- 5.3.9 Development Environment and Process

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Minor Software Change Justification (2 of 3)

- **5.3.10 Documentation**
- **5.3.11 Operational Characteristics**
- **5.3.12 Features / Functions Added**
- **5.3.13 Testing Performed**
- **5.3.14 Other Considerations**
- **NOTE: These items line up closely to N 8110 M&M paragraph 5.a that Leanna just presented**

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Minor Software Change Justification (3 of 3)

- **The change impact analysis should determine whether the change could adversely affect safe operation of the system or product**
- **Additionally updated data items need to be identified in the CIA**
- **Also Verification Activities required to verify the changes should be identified**

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Change impact analysis data

- Where is change impact analysis archived?
- Who reviews and approves change impact analyses?
- Concurrence with CIA prior to doing change
- Acceptance of minor change data after change completed

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Minor Software Change Impact Analysis Form

Request for Minor Software Modification

- Requestor: Unit Model: Date:
- Unit P/N: SW P/N: New SW P/N:
- Complete Description of Change:
- Responsible Engineer:
- DER Acceptance of Request:
- Date:

Concurrence of Minor Software Modification

- CO Number:
- Responsible Engineer:
- DER Concurrence:
- Date:

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Minor Software Change Impact Analysis Form	
• Effect of Change on:	Analysis
• Traceability	_____
• Memory Margin	_____
• Timing Margin	_____
•	
•	
•	
• Other (describe)	_____

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Minor Software Change Impact Analysis Form	
• Change Impact Analysis	<u>Yes</u> <u>No</u>
• Previous hazards as identified by the system safety assessment are changed.	
• Failure condition categories as identified by the system safety assessment are changed.	
• Safety margins are reduced.	
• Pilot workload is increased.	
• Situational awareness, warnings and alerts are changed.	
• Displayed information to make flight decisions is changed.	
• Assembly and installation requirements are changed. Etc	

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ACO issues

- How are minor change approvals communicated to ACO?
- How and when are minor change data transmitted to ACO?
- How is minor change data maintained for later inclusion into products FAA data package?
- How are minor changes reported in accomplishment summaries after the fact?
- MIDO issues
- Potential effects to CTA and FAI regulations
- Effects of CTA and FAI practices
- Required paradigm shifts

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Extended uses of change impact analyses

- Maintain control of exception conditions for deviations
- Maintain control of special conditions
- Specific example for a TCAS I processor
- Justification for Not Re-Submitting Deviations Request
 - Change Impact Analysis (Deviation Document Paragraph)
 - ◆ Have the suppression pulses sent during interrogations changed?
 - ◆
 - ◆ Have the advisory inhibit discrete inputs been changed?
 - Design Features That May Affect Deviations
 - ◆ Is active surveillance Range still limited to ...?
 - ◆ Are on-ground Mode-S intruders still tracked at the same rate...?

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Marketing requirements - new ideas need to be sold -

- **Sell your change impact analysis process to your ACO**
 - Communicating minor approvals
 - Forwarding minor approval data periodically
 - How will you police the inclusion of minor change data into future major releases
- **Sell your CIA process to your MIDO principal investigator**
 - Will Certified Test Articles be used in all tests
 - Will First Article Inspections always be required

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Training Requirements

- **Training your software engineering development staff in the change impact analysis process**
- **Train your design verification and configuration control library functions in the effects minor changes to software may have in the performance of their jobs**
- **Inform your senior and program management staffs that all changes are not "minor"**

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Fence issues

- Can a minor change be applied when the part number of the unit is changing?
- Can a minor change be applied to all levels of software criticality?
- Can I apply a similar process of CIA to changes other than software?
 - not within the scope of this notice
 - but it will be tried by some and some will succeed

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With all change comes grief

- Permit people to have it and acknowledge that you need to deal with it
- Be prepared to deal with, accept and facilitate discussion in the following areas:
 - all software changes are major
 - what if there is a major effect
 - why are we relaxing our conformity requirements
 - is software really like hardware

We might consider changing the title of our technology to "difficultware" in lieu of "software"

The bit and bytes of our ROM and FLASH devices are NOT subject to indiscriminate change

The bits and bytes of our programs do, for the most part, exhibit repeatable behavior and are tested to the best of our abilities

Every thing about software is not SOFT!

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Summary - Questions

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